



COURSE OUTLINE

SECTION I: BASIC COURSE INFORMATION

1. **COLLEGE:** Pierce
2. **SUBJECT (DISCIPLINE) NAME**¹ (40 characters, no abbreviations): Math
3. **COURSE NUMBER:** 263
4. **COURSE TITLE:** Calculus III
5. **UNITS:** 5.00
6. **CATALOG COURSE DESCRIPTION** -- Provide a description of the course, including an overview of the topics covered:

Concludes the study of calculus begun in Math 261. The concepts of the derivative and the definite integral are extended to functions of several variables in the form of partial derivatives and multiple integrals. In addition, the theory of limits, derivatives, and integrals are extended to vector-valued functions. Topics in vector calculus such as vector fields, line integrals, divergence and curl, Green's, Stokes', and the Divergence theorems are treated.

7. **CLASS SCHEDULE COURSE DESCRIPTION** -- Provide a brief description of the course, including an overview of the topics covered:

Concludes the study of calculus begun in Math 261. The concepts of the derivative and the definite integral are extended to functions of several variables in the form of partial derivatives and multiple integrals. In addition, the theory of limits, derivatives, and integrals are extended to vector-valued functions. Topics in vector calculus such as vector fields, line integrals, divergence and curl, Green's, Stokes', and the Divergence theorems are treated.

8. **COLLEGE APPROVAL DATE:**

9. **UPDATES** (check all applicable boxes):

- | | |
|--|-----------------------------------|
| <input checked="" type="checkbox"/> Content | Last Update: Jan. 17, 2005 |
| <input checked="" type="checkbox"/> Objectives | Last Update: Jan. 17, 2005 |
| <input type="checkbox"/> College Specific Course Attributes/Data Elements | Last Update: |
| <input type="checkbox"/> Districtwide Course Attributes/Data Elements | Last Update: |
| <input type="checkbox"/> Other (describe) | Last Update: |

¹ Underlined course attributes are the same for the course throughout the LACCD; all other course attributes are college specific.

10. CLASS HOURS:

	Hours per week (based on 18 weeks)	Total Hours per term (hrs per week x 18)	Units
Lecture:	5.00	90.00	5.00
Lab/activity (w/ homework):	0.00	0.00	0.00
Lab/activity (w/o homework):	0.00	0.00	0.00
Total:	5.00	90.00	5

Note: The Carnegie Rule and Title 5, section 55002 sets forth the following minimum standards: 1 unit = 1 hour lecture per week, 2 hours homework per week; **OR** 2 hours per week of lab with homework; **OR** 3 hours of lab per week without homework. The hours per week are based on a standard 18-week calendar. Lecture also includes discussion and/or demonstration hours, laboratory includes activity and/or studio hours.

11. PREREQUISITES, COREQUISITES, ADVISORIES ON RECOMMENDED PREPARATION, and LIMITATION ON ENROLLMENT

Note: The LACCD's *Policy on Prerequisites, Corequisites and Advisories* requires that the curriculum committee take a separate action verifying that a course's prerequisite, corequisite or advisory is an "appropriate and rational measure of a student's readiness to enter the course or program" and that the prerequisite, corequisite or advisory meets the level of scrutiny delineated in the policy.

Prerequisites: **Yes** (If yes, complete information below)

Subject	Number	Course Title	Units	Validation Approval Date (for official use only)
Math	262	Calculus II	5	
Score of 3 or more on the high school Advanced Placement Calculus BC Test				

Corequisite: **None** (If yes, complete information below)

Subject	Number	Course Title	Units	Validation Approval Date (for official use only)

Advisories: **None** (If yes, complete information below)

Subject	Number	Course Title	Units	Validation Approval Date (for official use only)

12. OTHER LIMITATIONS ON ENROLLMENT (see Title 5, section 58106 and Board Rule 6803 for policy on allowable limitations. Other appropriate statutory or regulatory requirements may also apply):

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SECTION II: COURSE CONTENT AND OBJECTIVES

1. COURSE CONTENT AND OBJECTIVES:

COURSE CONTENT AND SCOPE – Lecture: If applicable, outline the topics included in the lecture portion of the course (<i>Outline reflects course description, all topics covered in class.</i>)	Hours per topic	COURSE OBJECTIVES - Lecture (<i>If applicable:</i> upon successful completion of this course, the student will be able to... (<i>Use action verbs – see Bloom's Taxonomy below for "action verbs requiring cognitive outcomes."</i>))
1. Vector Algebra and Solid Geometry a. Vectors in R^2 and R^3 b. Dot and cross products of vectors c. Equations of lines in R^2 and R^3 d. Planes e. Quadric surfaces f. Cylindrical and spherical coordinate systems	15	Upon successful completion of this course, the student will be able to: 1. Use the dot and cross products to construct the equation of a plane, compute directional derivatives from the gradient, etc. 2. Construct the equation of a line in vector and parametric form 3. Construct equations of a plane in R^3 4. Graph surfaces and curves described in Cartesian, cylindrical, and spherical coordinate systems 5. Compute the tangent and normal vectors to curves and surfaces 6. Construct the equations of the tangent plane and normal line to smooth surfaces 7. Use the partial derivative and the total differential to approximate changes in a function 8. Sketch vector fields and compute their divergence and curl 9. Use optimization techniques, including Lagrange multipliers, to compute the maximum and minimum of a function of several variables 10. Formulate and employ multiple integrals to compute the area and volume of geometric objects 11. Compute double and triple integrals in Cartesian, polar, cylindrical, and spherical coordinates, and convert between different coordinate systems 12. Illustrate functions of several
2. Vector-Valued Functions a. Derivatives and integrals b. Tangents and normals	18	
3. Functions of several variables a. Limits and continuity b. Representations of functions of several variables including contour diagrams, 3D graphs, tables, equations c. Partial Derivatives d. Differentials e. Gradients and directional derivatives f. Tangent planes and normals g. Optimization with and without LaGrange multipliers	18	
4. Multiple Integration a. Double integrals in rectangular and polar form b. Triple integrals and their applications in rectangular, cylindrical, and spherical coordinate systems c. Areas and volumes	18	
5. Topics in Vector Calculus a. Vector fields b. Line integrals c. Div and Curl d. Green's Theorem	21	

e. Surface integrals f. Stoke's and Divergence Theorems This course may also include: 1. Kepler's Laws 2. Frenet-Serret Formulas 3. Change of variable using Jacobians		variables using contour diagrams and tables, and use these representations to estimate directional derivatives and gradients 13. Employ Green's, Stokes', and the Divergence Theorem to compute integrals 14. Compute line integrals
Total lecture hours*	90	

*Total lecture and laboratory hours (which includes the final examination) must equal totals on page 1.

2. REQUIRED TEXTS:

Provide a representative list of textbooks and other required reading; include author, title and date of publication:

Calculus of Several Variables by Stewart;
 Calculus of Several Variables by McCallum

3. SUPPLEMENTARY READINGS:

Reading assignments may include, but are not limited to the following:

4. WRITING ASSIGNMENTS:

Title 5, section 55002 requires grades to be "based on demonstrated proficiency in subject matter and the ability to demonstrate that proficiency, at least in part, by means of essays or, in courses where the curriculum committee deems them to be appropriate, by problem solving exercises or skills demonstrations by students." Writing assignments in this course may include, but are not limited to the following:

Writing assignments in this course include, but are not limited to, problem solving exercises.

5. REPRESENTATIVE OUTSIDE ASSIGNMENTS:

Out of class assignments may include, but are not limited to the following:

6. REPRESENTATIVE ASSIGNMENTS THAT DEMONSTRATE CRITICAL THINKING:

Title 5, section 55002(a) requires that a degree applicable course have a level of rigor that includes "critical thinking and the understanding and application of concepts determined by the curriculum committee to be at college level". Critical thinking may include, but is not limited to analysis, synthesis, and evaluation. Provide examples of assignments that demonstrate critical thinking.

Writing assignments involve problem solving and analysis. For example: "Find the parametric equations that describe a torus. Graph your equations with graphing technology to show the torus."